CUTEC Quickened and Full of Energy

CUTEC NEWS

FACTS · INFORMATION · ANALYSES

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Oil Fields of the Future

Besides the current temperatures, fuel prices can also be expected to reach an all-time high in Germany. The continuing price increase during the past months has not only frustrated the consumer at the filling station, but also threatens the anticipated economic recovery.

One should bear in mind that the earth's fossil energy reserves are limited, even though experts cannot agree on how long adequate supplies can still be ensured. Moreover, the predictable demand for oil will continue to increase during the coming years, particularly because of the economic boom in Asia, and a further increase in fuel prices can therefore be expected in the long term.

For ensuring mobility in our society as a basis for the economy in the future, innovative concepts are in correspondingly great demand. With the ArtFuel[1] and Renew[2] projects, CUTEC has been conducting active research in the promising field of fuel synthesis from renewable raw materials. In contrast to the well known Biodiesel from rape oil, the biomass from plants is totally utilised in the present process. A model of the pilot plant, which is still under construction, has already been presented in a CUTEC exhibit at the *Woche der Umwelt* (Environment Week) in Bonn. If fuel synthesis from biomass can be realised on an industrial scale with due consideration of economic factors, today's agricultural fields could become tomorrow's oil fields, and farmers would be the energy suppliers of the future.

In a country where raw materials are scarce, it is everyone's duty to be especially careful in using energy, since saving energy is still the nation's best source of energy. In this context, I wish to point out the nation-wide information campaign, *"Initiative EnergieEffizienz"* of the *Deutsche Energie-Agentur (dena)*, which provides information and practical tips for more efficient use of energy by everyone.

Yours, Otto Carlowitz

[1] Project of the *Land Niedersachsen* (German Federal State of Lower Saxony)
[2] Project of the European Union

IN THIS EDITION

President's *Woche der Umwelt* (Environment Week)

CUTEC presents the ArtFuel Project

At the beginning of June, President Rau extended his invitation to attend a *Woche der Umwelt* (Environment Week) for the second time. On the occasion of the International Conference on Renewable Energy, "renewables 2004", this year's event took place simultaneously in Bonn under the motto "Energy for Sustainable Development". In the garden of the Villa Hammerschmidt, about 50 previously selected exhibitors presented their innovations centred around the topic of regenerative energy sources. CUTEC presented to the public a scale model of a new pilot plant for the production of synthetic fuels from renewable raw materials; this facility is currently under construction for the ArtFuel[1] and Renew[2] projects in Clausthal. In this plant, the fuel is synthesised by way of a process chain which comprises several process units. On the way from the biomass to the fuel, special attention must also be paid to the interfaces in the process chain, in addition to optimising the operational parameters for each process unit. Thus, a prime objective of future investigations at CUTEC is the generation of a comprehensive database, which was not available in this form in the past and which is ultimately suited for determining the optimal operational parameters for producing synthetic fuels from renewable raw materials.

In his speech at a reception held in the course of the Environment Week, the President emphasised that the search for alternatives to the limited fossil energy resources is of paramount importance nowadays for ensuring an adequate supply of energy to future generations. (ge/he)

Even the young "experts" demonstrated great interest in CUTEC know-how

CUTEC at the Hannover Industrial Fair 2004

Visit to the Stand by the Minister of the Environment in Lower Saxony

In April CUTEC was represented for the first time with its own stand at the Hannover Industrial Fair. On the one hand, a model of the Clausthal Energy Park was presented at the CUTEC stand in Hall 13 (Energy). The purpose of this plant is to ensure the supply of electric power and heat to the CUTEC building from a combination of renewable energy sources in off-grid operation in correspondence with requirements. By means of the Internet, the webcams in the control system were employed for demonstrating the functional principle to visitors. The Clausthal Energy Park is operated as a joint venture with the Technical University of Clausthal and the Public Utilities in Clausthal. Moreover, a novel conditioning system for optimal dewatering of sewage sludge on a full scale was demonstrated at the fair. This development is directly associated with the steadily increasing cost of sewage-sludge disposal, with an annual total of about 2 900 000 t in the Federal Republic of Germany. With the use of this process, waste-disposal costs can be decreased by up to 30 per cent by improved conditioning and dewatering of the sludge. The process was among the short-list candidates for the international technology prize, Hermes Award. The advantages of the process were explained to Lower Saxony's Minister of the Environment Sander during his visit to the CUTEC stand. (schr)

Minister of the Environment Sander (right), speaking with the specialists from CUTEC

Cutec GmbH

Conditioning System

HERMES AWARD 2004

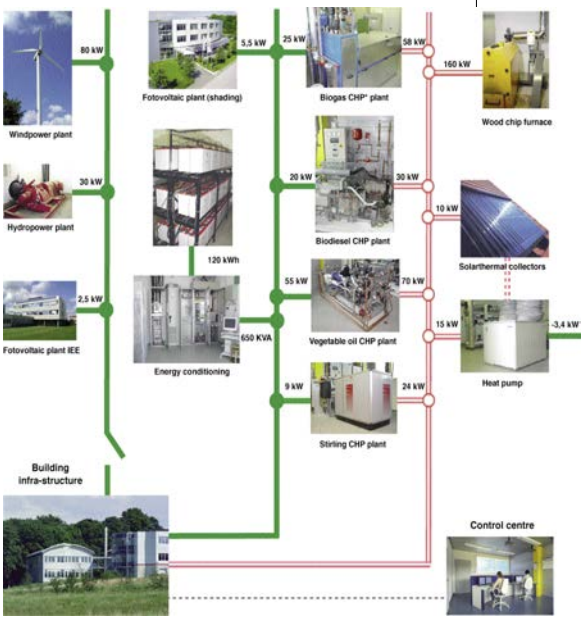
With the new conditioning system, sewage sludge is dewatered by a new method. Because of the higher efficiency, the amount of sludge remaining for disposal as well as the operating costs are decreased considerably. Today, flocculants are also added for dewatering sewage sludge. The CUTEC system is based on a new process-engineering concept for increasing the efficiency. For this purpose, the relationship between the floc size and the result of dewatering has been determined. For industrial applications, a flexible adaptation to match different sludge conditions can be achieved by appropriately adjusting the operating parameters. An increase in settling rate results in improved purification efficiency.

Article from: IndustrieMagazin 6/2004, page 12

Conclusion of the Support Phase for the Project "Clausthal Demonstration Plant for Decentralised Regenerative Energy Supply Systems"

The initial phase of the project, "Energy Park Clausthal", has been concluded during the interim. In the course of the joint venture, several currently relevant renewable energy sources have been coupled to form a combined system for supplying the required energy to the CUTEC building. Since the necessary power can be drawn from various energy sources in the combined system – in correspondence with their availability, – CUTEC is ensured of a complete and constant power supply exclusively from regenerative sources. The objective is a dynamic adaptation of the coupled power generation to match the demand. The system also provides for off-grid operation, that is, operation which is independent of the public power supply grid.

For pure electric power generation, a wind turbine, a hydropower plant, and two photovoltaic plants are available. In correspondence with the season and weather conditions, power is drawn from these non-controllable energy sources and supplied to the electric power system at CUTEC. The resulting difference between the supply from the aforementioned combined plant at any time and the actual demand can be compensated by so-called combined heat and power plants, which are switchable and can be powered with biogenetic fuels. The actual power demand at any time is indicated by a control system. Moreover, an energy conditioning system ensures the required net quality, especially for off-grid operation. The heat from the combined heat and power plants is employed for heating purposes. In addition, a wood-chip combustion plant, several solar collectors, and a heat pump are available. (See the following figure.)



Process flow chart of the Energy Park

The establishment and commissioning of the Energy Park has been supported by the Deutsche Bundesstiftung Umwelt (German Federal Environmental Foundation) from 2000 until the end of 2003. The partners in the project, the Technical University of Clausthal[1], the Stadtwerke Clausthal-Zellerfeld GmbH (Public Utilities), and CUTEC, have committed themselves to an overall operating period of 10 years until 2010.

Even at present, a number of interesting results have already become available. The successful use of the Energy Park as a demonstration plant has resulted in several term papers and diplom dissertations, as well as the accessibility to a large number of visitors and visiting groups. The establishment of this regenerative energy supply system has proved to be quite unique in Germany and beyond the national borders. Besides continuous improvement and upgrading of the system, increasing research is in progress for continuing development. (si)

[1] Especially the Institute of Power Engineering (IEE) and the Institute of Energy Process Engineering and Fuel Technology (IEVB)

Utilisation of Renewable Energy by Phytoextraction from Contaminated Soils

Good weather-proofing was an absolute prerequisite during an excursion by geologists, botanists, and other participants in the project, "Network Phytoextraction", in our region in May 2004. Subsequent to their second project meeting, this excursion led them to contaminated areas at various locations in the Harz Mountains and foreland (see following figure). Special attention was paid to areas contaminated with heavy metals, which have resulted from more than 1000 years of mining activity. With its various mining districts, the Harz Mountain Region is a prime example of intensive utilisation effects. This area was an especially important industrial centre of the early Modern Age, and the consequences of ore mining, dressing, and further processing are therefore evident everywhere.

Contamination of soils by immissions originating from a wide variety of sources presents a major challenge to the sciences. Industrial use, pollution as a result of warfare, leaching of pollutants into the ground water and thus into drinking water, demand effective action, especially in densely populated areas. Propagation of pollutants along various paths, such as soil-plant, or soil-humans, must also be prevented.

In their project, the experts are considering new methods for the decontamination of such areas. The approach involves the search for appropriate plants which are capable of extracting the contaminant from the soil. This is only the first step, however. The main objective of the BMBF-supported research project (project-executing organisation: *Deutsches Zentrum für Luft- und Raumfahrt e.V.* – German Aerospace Centre) is a combination with subsequent utilisation of the biomass as a source of renewable energy.

In their network, some 25 researchers from Austria, the Netherlands, and Germany wish to provide new impulses for this process. Their study, which will also include a description of case studies, is intended to indicate investment potential and generate new research projects. (kra)

Well equipped with umbrellas during the CUTEC excursion

1st Clausthal Conference on Emission Trading

On 16th March 2004, the 1st Clausthal Conference on Emission Trading was held at the CUTEC Institute. The event was organised by the Competence Centre for Climatic and Energy Economics, a division of the Department of Economics, Law, and Technology Assessment, in cooperation with the evangelische Akademie Loccum. The topic of the conference was: 'What comes after the allocation plan?' The background to this question is the fact that the national authorities had to forward the CO_2 requirements of the affected companies to the EU Administration in Brussels no later than 1st April 2004, even though some important aspects had not yet been clarified. For instance, how does the EU ensure that the 15 individual national allocation plans are compatible with respect to those aspects which are specific to the individual countries? Or: How do the national allocation plans affect the competitive capability of the affected companies, and how does this compare on a European as well as international basis? For this purpose, high-ranking speakers from industry (Dr. J. Rothermel, VCI, Frankfurt), politics (Min. Dir. Dr. U. Lahl, BMU, Berlin), and science (Prof. Dr. W. Ströbele, theoretical economics, University of Münster) were heard, and various trial solutions were developed in a subsequent round of discussions. The resulting solution was supported by the majority of the participants: As far as possible, the governmental emission-trading agencies should be distributed in a decentralised manner among existing structures. Well-founded information on the affected companies is already available there, and effective cooperation with these companies is thus ensured.

The 1st Clausthal Conference was accepted in a highly positive way by the participants and has thus contributed to the solution of questions which are still open in the European emission-trading system. (sr)

VDI Seminar at CUTEC

Last year, a VDI seminar, "Deposits and Corrosion in Heavy Power Plants", was organised by CUTEC. In view of the favourable response and the continuing importance of this topic, a follow-up seminar was held from 4th to 5th May of this year. Investigations conducted during the past twelve months and newly acquired results were presented and discussed. As fittingly indicated by Prof. Carlowitz in his concluding comments, the discussions have assumed a more definite structure during the interim, and solution strategies can now be recognised more clearly. On the other hand, the form in which deposits and corrosion occur, as well as the firing technology itself, have proved to be highly diversified. The need for further investigations, discussions, and seminars thus appears to be a certainty. (ha)

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Two New Employees in the CUTEC Team:

Dipl.-Ing. Daniela Perbandt and Beate Firneisen

Dipl.-Ing. Daniela Perbandt is by no means unknown at CUTEC. Since 2001, she has already been successfully supporting the activities of the working group, "Soil Conservation and Waste Disposal", as a scientific assistant. Mrs. Perbandt completed a course of study in geotechnology, mining, as well as oil and gas technology at the Technical University of Clausthal, with special emphasis on the field of remediation of polluted sites. Since 1st April 2004, she has been employed at the Department of Environmental Economics, Environmental Law, and Technology Assessment at CUTEC and is working in the "Project Team Phytoremediation".

Likewise on 1st April 2004, Beate Firneisen began her employment in the CUTEC laboratory. Mrs. Firneisen received her training as a chemotechnical assistant at the *Berufsfachschule für Chemie* (Industrial Technical School of Chemistry) – Dr. Morgenstern – in Braunschweig. She had already worked in her professional field for several years before coming to CUTEC. Among other activities, her duties include the independent performance and checking of analyses, as well as the supervision of experiments in the course of research work. (he/wes)

Mrs Firneisen (left) und Mrs Perbandt

New Textbook by Prof. Michael F. Jischa:

Engineering Sciences: An Official Textbook for the "Jahr der Technik"

The new textbook provides a clear-cut introduction to the fundamental principles of the engineering sciences as well as the reasoning and methods applied by the engineer. After a brief outline of the changes in fields of engineering activity, the individual subjects in an engineering course of study are described in the main section of the book. The author draws particular attention to environmental research in the engineering sciences, considers the associated methods of management, and places special emphasis on technology assessment as an instrument for sustainability management. This book has been published by Springer-Verlag and concludes a five-part series, „Studium der Umweltwissenschaften" [("Studies in the environmental Sciences")]. (he)

Report from the Workers' Council

The meeting of the Workers' Council at CUTEC-Institut GmbH on 21st April 2004 was attended with great interest by the CUTEC staff. Besides the report on the activities of the Workers' Council, the agenda included a speech by Peter Züchner, Trade Union Secretary ver.di., who reported on current developments in the Bundesangestelltentarif (employee wage system in the Federal Republic of Germany). Mr. Züchner drew special attention to the cancellation of the collective bargaining agreement by the Rate Association of the German Federal States, as a result of which a Christmas bonus and a holiday bonus will be paid only to employees who have already held an employment contract before the summer of 2003. Finally, the meeting was concluded with a constructive discussion on improvements in operational procedure which can favourably

Scientific Advisory Board at CUTEC: Prof. Dr.-Ing. Jobst Hapke – a personal profile

Prof. Jobst Hapke

Prof. Hapke was born in Wattenscheid in 1940. After his training as a shop mechanic at Thyssen-Gießerei AG in Gelsenkirchen, he completed his studies in the field of mechanical engineering / process engineering at the Technical University of Berlin. He passed the major examination for his Diplom with distinction, for which he received a medal as the best in his class. In 1968, he started his career as a scientific assistant at Friedrich Krupp GmbH in Essen. After several years of activity in responsible positions at various industrial companies and the simultaneous completion of his doctorate at the Technical University of Clausthal as an external candidate in 1973, he was appointed to a professorship in the Department of Chemical Engineering at the University of Dortmund in 1977. From 1982 to 1983, he served as Dean of the Department, and as Senator at the University of Dortmund from 1984 to 1988. In 1990, he was appointed to a professorship at the Technical University of Hamburg-Harburg, where he currently heads the Division of Apparatus Construction and performs research in the fields of hydrogen technology and membrane separation technology. After serving in various offices (including Vice-President) at the university, he is now a member of several committees. He was appointed to the Scientific Advisory Board at CUTEC as the successor of, and upon recommendation by, Prof. Paul, the former Head of the Institute for Chemistry at the GKSS Research Centre. Prof. Hapke: "I wish to help CUTEC in becoming a partner to small and medium-sized enterprises as well as regional industrial companies, even more than in the past, in the development of innovative products and systems for environmental and power engineering. Moreover, I wish to assist CUTEC in developing its competence in the application of scientific results and methods in practice as well as in the field of modelling and simulation of complex systems." For achieving these objectives, he will make use of his network in university and industrial research and draw attention to benchmark developments in environmental and power engineering, as well as in systems engineering. (he)

DATES

- CUTEC- Presentations at
  - The Big 5 Show 2004 from 20th to 24th November in Dubai, UAE